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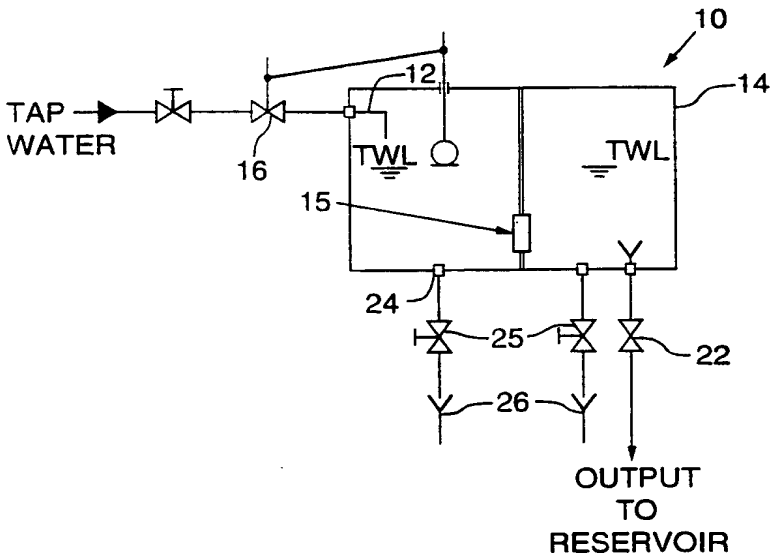
(88) Date of publication of the international search report:
10 February 2000 (10.02.00)

(54) Title: WATER SANITIZING SYSTEM

(57) Abstract

A device for sanitizing and dispensing water used in dental and other medical procedures provides a sanitizing tank (14) into which municipal tap water or another water supply is sanitized to kill harmful bacteria and other micro-organisms. The sanitized water is drained to a reservoir when the level of water in the reservoir reaches a selected lower limit, as detected by a level sensor which signals a valve between the sanitizing tank and the reservoir to open. The sanitized water can be used in medical or dental procedures which require large amounts of water for irrigation, cooling or other purposes. The dispensing system provides selectable distribution of the sanitized water through an existing dental distribution system, supplying disinfectant to certain dispensing devices and systems while supplying sanitized water to others.



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INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 99/00233

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C02F1/50 A61C1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C02F A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 049 552 A (ARFF JOHN H) 20 September 1977 (1977-09-20) column 4, line 53 -column 5, line 21	10,11,13
A	column 6, line 56 -column 7, line 15; figure 3	1-9,12, 14-16
A	US 4 216 185 A (HOPKINS DALE W) 5 August 1980 (1980-08-05) column 5, line 67 -column 7, line 55; figure 1	1-16
A	US 5 295 829 A (FREY HANS-PETER ET AL) 22 March 1994 (1994-03-22)	
A	US 5 709 546 A (WAGGONER MARK B) 20 January 1998 (1998-01-20) cited in the application	

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
18 November 1999	26/11/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Assogna, R

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 99/00233

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication.where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 158 454 A (BECK ERNST G ET AL) 27 October 1992 (1992-10-27) cited in the application	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CA 99/00233

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 4049552	A	20-09-1977	NONE		
US 4216185	A	05-08-1980	NONE		
US 5295829	A	22-03-1994	EP	0524334 A	27-01-1993
			DE	59103708 D	12-01-1995
			DK	524334 T	15-05-1995
US 5709546	A	20-01-1998	WO	9823218 A	04-06-1998
US 5158454	A	27-10-1992	DE	3937578 A	16-05-1991
			AT	101991 T	15-03-1994
			DE	59004767 D	07-04-1994
			EP	0428031 A	22-05-1991
			JP	3186257 A	14-08-1991

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
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in its capacity as elected Office

Date of mailing (day/month/year) 25 November 1999 (25.11.99)	
International application No. PCT/CA99/00233	**Applicant's or agent's file reference** E
International filing date (day/month/year) 19 March 1999 (19.03.99)	**Priority date** (day/month/year) 25 March 1998 (25.03.98)
Applicant LUSCOMBE, John, Stanbury	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

22 October 1999 (22.10.99)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Lazar Joseph Panakal
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
645-2/MBE		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/CA 99/ 00233	19/03/1999	
Applicant		
HYGENITEK INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing ha been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

   [ ] as suggested by the applicant.

   [ ] because th applicant failed to suggest a figure.

   [X] because this figure better characterizes th invention.

   [ ] None of th figures.

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

A device for sanitizing and dispensing water used in dental and other medical procedures provides a sanitizing tank (14) into which municipal tap water or another water supply is sanitized to kill harmful bacteria and other micro-organisms. The sanitized water is drained to a reservoir when the level of water in the reservoir reaches a selected lower limit, as detected by a level sensor which signals a valve between the sanitizing tank and the reservoir to open. The sanitized water can be used in medical or dental procedures which require large amounts of water for irrigation, cooling or other purposes. The dispensing system provides selectable distribution of the sanitized water through an existing dental distribution system, supplying disinfectant to certain dispensing devices and systems while supplying sanitized water to others.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 99/00233

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IPC 7 C02F1/50 A61C1/00

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C02F A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	column 6, line 56 -column 7, line 15; figure 3	1-9,12, 14-16
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Date of the actual completion of the international search	Date of mailing of the international search report
18 November 1999	26/11/1999

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

[redacted]ormation on patent family members

[redacted] International Application No
PCT/CA 99/00233

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4049552 A	20-09-1977	NONE	
US 4216185 A	05-08-1980	NONE	
US 5295829 A	22-03-1994	EP 0524334 A	27-01-1993
		DE 59103708 D	12-01-1995
		DK 524334 T	15-05-1995
US 5709546 A	20-01-1998	WO 9823218 A	04-06-1998
US 5158454 A	27-10-1992	DE 3937578 A	16-05-1991
		AT 101991 T	15-03-1994
		DE 59004767 D	07-04-1994
		EP 0428031 A	22-05-1991
		JP 3186257 A	14-08-1991

PATENT COOPERATION TREATY

Applicant: **HYGENITEK INC.**

Title: **WATER SANITIZING SYSTEM**

Int'l Filing No.: **PCT/CA99/00233**

Int'l Filing Date: **19 March 1999**

Our Reference: 645-2/CJL

20 Queen St. W., Ste. 3202, Box 102
Toronto, Ontario M5H 3R3

May 8, 2000

The International Preliminary Examining Authority
European Patent Office
D-80298 Munich
Germany

Attention: Assogna, R.

Dear Sir/Madam:

This in response to the written opinion dated February 8, 2000. Kindly amend the application as follows:

IN THE DISCLOSURE

Replace page 7 of the Description with new page 7 enclosed herewith.

IN THE CLAIMS

Replace the current set of claims with the new set of claims enclosed herewith.

REMARKS

Discussion of the Figures

The Examiner stated that reference number 10 on page 5 could not be found in the figures. The Applicant respectfully submits that reference number 10 can be found at the top right hand corner of figure 1 and denotes the water sanitizing system as a whole.

Discussion of the Description

The Examiner also pointed out that the units "gallon" employed on page 7 are not additionally expressed in terms of units stipulated by Rule 10.1(a) and (b) of the PCT. Accordingly, the Applicant has amended the Description at page 7 to specify that a gallon is approximately 4.5 litres.

Discussion of the Claims

On the basis of the Arff reference, the Examiner has held the claims of the instant application to be either lacking in novelty or lacking an inventive step. Below, the Applicant submits specific remarks with respect to each of the Examiner's objections to the various claims.

In addition, Applicant submits the following general remarks of distinction between the Arff reference and the present application for patent. An important difference between the present application and Arff is that Arff relies on a series of pumps which are run with electricity. The casing associated with the forced cooling system of Arff is formed of electrically conducting metal. The device and method of the present application are driven by line pressure, specifically air pressure (see for example claim 3, and also page 6 lines 18 and 19) and not by specific pumps in the device as described and relied upon by Arff. Furthermore, our device operates using ordinary tap water and does not receive a coolant as required by Arff. Our device also relies on gravity feed in the methodology

Additionally, Arff teaches ozonation as its means for sanitizing and the present application provides the distinct advantage of not requiring the complex apparatus for the ozonation process.

To clarify these differences, and further distinguish the present invention from the Arff reference, the Applicant has amended claims 1 and 10 to specify that the device and method are air pressure driven, that they use ordinary municipal tap water (support for this amendment is found, for example, at page 5, line 2), and the sanitizing region is at a higher level than the reservoir for gravity feed between the two.

It is submitted that by these amendments, Applicant has further distinguished itself from the Arff reference and better defined the invention.

Claim 10

The Examiner objected to claim 10 on the grounds that the subject matter of the claim is not novel. Specifically, the Examiner cites U.S. Patent No. 4,049,552 (Arff). The Applicant respectfully disagrees. At column 5, line 11 to column 5, line 21, the Arff patent describes a sensor 82 that monitors the water level in the treatment tank 62. This sensor 82 is in circuit 84 with a valve 86 that controls the flow of water into the treatment tank 62. Claim 10 of the subject application claims "draining the batch of sanitized water from the sanitizing region to the reservoir responsive to the water level in the reservoir reaching a selected lower limit. . .". Unlike the Arff patent, the water level sensor monitors the water level in the reservoir, of the present application, which corresponds to the storage tank 66 in the Arff patent. The Arff patent is lacking in this type of sensoring system to monitor the water level in the storage tank 66. Furthermore, the Applicant's invention controls not only the flow of water into the reservoir, but also controls an air pressure valve which, in turn, controls the air pressure applied to water as it flows out of the reservoir. The Applicant's invention has the advantage of having more controls over the water level because the sensor is in circuit with components controlling both water flowing into the reservoir and water flowing out of the reservoir. Therefore, claim 10 teaches subject matter that is novel and conveys a new advantage to users of water sanitization systems.

Claims 11 and 13

The Examiner also objected to claims 11 and 13 on the grounds that the subject matter in these claims was not novel in light of the Arff patent.

Claim 11 claims a step of "interrupting communication between the sanitizing region and the reservoir responsive to the water level in the reservoir reaching a selected upper limit." This step is not described in the Arff patent. The Arff patent includes a step involving the interruption of the flow of water into the treatment tank 62 responsive to a sensor 82 that monitors the water level. In contrast, claim 11 involves interrupting the flow of water from

the sanitizing region (which corresponds to the treatment tank 62 in the Arff patent), to the reservoir, which corresponds to the storage tank 66. The Applicant respectfully submits that claim 11 is novel because it describes a method of controlling the flow of water at a specific point in the water sanitization process whereas the Arff patent does not describe or contemplate such method of control.

Claim 13 teaches a method wherein the air pressure in the reservoir is controlled by an air valve. There is no corresponding subject matter described in the Arff patent. At column 5, line 6, the Arff patent describes a pressure regulated valve 80 which operates a pump 68. This valve 80 responds to pressure from water that is drawn off from the storage tank 66. The Applicant's invention also describes a pressure valve involved in controlling the amount of water flowing out of the reservoir. However, unlike the Arff patent, this valve does not respond to water pressure. Instead, it controls the air pressure in the reservoir. An increase in the air pressure through the use of the air valve causes more water to flow out of the reservoir. This has the advantage of having more direct control over the water level in the reservoir than the method described in the Arff patent. Therefore, the Applicant respectfully submits that claim 11 should issue because it teaches a method with a novel advantage not found in the Arff patent.

Claims 12, and 14 to 16

It is respectfully submitted that claims 10 and 11 are novel and have an inventive step for the reasons given above. Since claims 12, 14 and 16 depend from claims 11 and 10 respectively, it is submitted that these claims also are novel and have an inventive step.

The Applicant respectfully submits the following additional remarks with respect to Claim 12. Claim 12 involves a step of pressurizing the air in the reservoir such that water is dispensed from the reservoir under pressure. The Arff patent does not involve any steps using <u>air</u> pressure to control the flow of water out of either the treatment tank 62 or the storage tank 66. Like other prior art, the Arff patent relies on <u>water</u> pressure and a consequential system of pumps. Claim 12 conveys the novel advantage of having more direct control over the flow of water out of the reservoir through the use of air pressure. Applicant therefore respectfully submits this claim has an inventive step.

Claim 15

The Examiner also stated that Claim 15 was non-inventive. For the reasons given above, it is submitted that Claim 10 (from which Claim 15 depends) is novel and involves an inventive step. Since Claim 15 depends from Claim 10 we submit it is also novel and inventive. Furthermore, Claim 15 describes a method of draining sanitized water to the reservoir under the influence of gravity. In contrast, prior art such as the Arff patent utilizes a system of pumps to move the water from one tank to another. Claim 10 has been specifically amended to identify this gravity feed from the sanitizing region to the reservoir. The Applicant's arrangement has the advantage of not requiring the energy that would be needed to operate these pumps or the problems presented in maintaining these pumps in working order. The Applicant respectfully submits that claim 15 is inventive.

Claim 1

In objecting to claim 1, the Examiner stated that the subject matter of this claim differs from what is described in the Arff patent only in that the reservoir has an upper limit level sensor and a lower limit sensor. The Examiner also stated that this difference does not seem critical nor does it achieve surprising effect. The Applicant respectfully submits that there are important and significant differences between the subject matter in claim 1 and the Arff patent. In the Arff patent, the sensor 82 is used to monitor the water level in the treatment tank 62 and this helps to control the amount of water flowing into the tank 62. As previously mentioned, the Applicant's sensor system is located in the reservoir which corresponds to the storage tank 66 in the Arff patent. The Arff patent has no similar device to monitor the water level in the storage tank 66. Furthermore, as previously mentioned, the Applicant's invention has the advantage of having more control over the water level because the sensor is in circuit with components, including the air pressure valve, that control both water flowing into the reservoir and water flowing out of the reservoir. Therefore, the Applicant respectfully submits that claim 1 has subject matter that is inventive.

Claim 1 has been further amended to specifically claim further inventive features to further distinguish the subject matter of Claim 1 from Arff, namely:

- air pressure driven;
- municipal tap water supply; and
- gravity feed.

All of these distinguish by providing the distinct advantage of not relying on pumps, as Arff clearly does.

Claims 2 to 9

The Examiner also objected to claims 2 to 9 on the grounds that they lack an inventive step. All of these claims depend, either directly or indirectly, from Claim 1 which for the reasons given above Applicant submits is novel and inventive.

With respect to some of the specific claims 2 to 9, Applicant has the following additional remarks. Claim 2 claims a device wherein a valve interrupts the flow of water between the sanitizing region and the reservoir responsive to the water level in the reservoir reaches a selected upper limit. Prior art, such as the Arff patent, does not teach any monitoring of the water level in the reservoir or the interruption of the flow of water into the reservoir responsive to such monitoring. The Applicant respectfully submits that claim 2 is inventive because it describes a device capable of controlling the flow of water at a specific point in the water sanitization process where the prior art does not describe any such method of control.

Claims 3 and 4 claim the use of an air valve to control the pressure applied to the water in the reservoir. The Applicant respectfully submits that these claims involve inventive steps. As mentioned above, the use of air pressure to control the level of water in the reservoir is not described in the Arff patent which uses a system of pumps. This step has the distinct advantage of exercising more direct control over the water level.

Claim 6 claims an arrangement for the sanitizing tank and the reservoir such that the batch of sanitized water drains into the reservoir under the influence of gravity. This arrangement is not mentioned in prior art such as the Arff patent which depends on a system of pumps. The Applicant's invention is advantageous in that there is no requirement for the energy needed to

drive pumps. Another advantage is that the Applicant's invention reduces the need for pump maintenance. For these reasons, the Applicant respectfully submits that claim 6 comprises an inventive step.

Claim 7 describes the inclusion of a drain to the sanitizing region for draining excess sanitized water. This element is not provided for in the corresponding treatment tank 62 of the Arff patent. At column 5, line 20, the Arff patent mentions that the treatment tank 62 has a vent 89. This vent 89 does not appear to be capable of draining off any significant amount of excess water in the treatment tank 62. The Applicant respectfully submits that claim 7 involves an inventive step over the cited art, especially in combination with the distinctions and advantages of Claims 1 and 2 from which it depends.

Claim 16

To address the examiner's concern about the lack of structure in claim 16, Applicant has amended claim 16 to include a backflow valve to achieve the claimed result.

Entry of this amendment is respectfully requested. In view of these submissions, favourable consideration and allowance of the application are respectfully requested.

Yours very truly,

Cynthia J. Ledgley

Agent on Behalf of Applicant

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Encls. - amended page 7
- amended claims 1 to 16

sanitizing tank 14 and opens the solenoid valve 36 to introduce pressurized air to the reservoir 20 for further dispensing.

In the preferred embodiment, the batch of water stored between the upper and lower level limits of the reservoir 20 may be approximately one gallon (approx. 4-5 litres), which is suitable for most dental procedures. For special procedures requiring more water, or for use in industrial processes or other medical uses in which a higher rate of sanitized water supply may be required, the capacity of the sanitizing tank 14 and/or the reservoir 20 can be adapted accordingly. In any case the sanitization process according to the invention operates as a batch procedure, wherein a predetermined volume of water is being sanitized in the sanitizing tank 14 while a previously sanitized batch of water is available for dispensing from the reservoir 20 in the manner indicated above.

An embodiment of a dental dispensing apparatus 2 utilizing an air/water distribution system commonly found in dental chairs is shown in Figure 3 by way of example. However, the sanitizing system of the invention is capable of more general application and is not limited to use with any particular dispensing apparatus or distribution system. Conversely, the dispensing apparatus of the invention is not limited to use with the batch sanitizing system of the invention, although it may be advantageously so employed.

The dispensing apparatus 2 is capable of interfacing with existing air and water regulating and control devices in a dental office, providing decontamination and flushing facilities and selecting particular devices, such as high-speed drills, to be supplied with either water or disinfectant while maintaining "water only" supplies to other instruments such as syringes. Thus, unlike conventional dispensing systems the provision of sanitized water or disinfectant in the dispensing system of the invention is on a non-exclusive basis.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An air pressure driven water sanitizing device comprising:

a water inlet for connection to a municipal tap water supply,

a sanitizing region in fluid communication with the water inlet, for sanitizing water from the water supply to produce a batch of sanitized water,

a reservoir, at a lower level than the sanitizing region, for storing the batch of sanitized water, in fluid communication with the sanitizing region and having a water outlet, an upper limit level sensor and a lower limit level sensor, and

a valve disposed between the sanitizing region and the reservoir to permit a flow of water from the sanitizing region to the reservoir when the lower limit level sensor detects that a water level in the reservoir has reached a selected lower limit.

2. The device of claim 1 wherein the valve interrupts the flow of water from the sanitizing region to the reservoir when the upper limit level sensor detects that a water level in the reservoir has reached a selected upper limit.

3. The device of claim 2 wherein the reservoir is provided with a source of pressurized air whereby the batch of sanitized water is dispensed from the reservoir under pressure.

4. The device of claim 3 wherein an air valve is disposed between the air supply and the reservoir.

5. The device of claim 4 wherein the air valve is solenoid operated.

6. The device of claim 1 wherein the sanitizing region comprises a sanitizing tank positioned at a higher level than the reservoir so that the batch of

sanitized water drains into the reservoir under the influence of gravity.

7. The device of claim 2 wherein the sanitizing region is provided with a drain for draining excess sanitized water remaining in the sanitizing region after the valve closes.

8. The device of claim 1 wherein the reservoir is provided with a drain for draining sanitized water from the reservoir.

9. The device of claim 1 additionally comprising a check valve disposed upstream from the sanitizing region to prevent a backflow of water from the device into the water supply.

10. An air pressure driven method of dispensing sanitized water, comprising the steps of:

(a) sanitizing a batch of municipal tap water in a sanitizing region;

(b) detecting a water level in a reservoir in fluid communication with the sanitizing region;

(c) draining, by gravity feed, the batch of sanitized water from the sanitizing region to the reservoir responsive to the water level in the reservoir reaching a selected lower limit; and

(d) dispensing the sanitized water from the reservoir.

11. The method defined in claim 10 further comprising the step of interrupting communication between the sanitizing region and the reservoir responsive to the water level in the reservoir reaching a selected upper limit.

12. The method defined in claim 11 further comprising the step of pressurizing the air in the reservoir whereby the batch of sanitized water is dispensed from the reservoir under pressure.

13. The method defined in claim 12 wherein the air pressure in the reservoir is controlled by an air valve.

14. The method defined in claim 13 wherein the air valve is solenoid operated.

15. The method defined in claim 10 wherein the batch of sanitized water drains to the reservoir under the influence of gravity.

16. The method defined in claim 10 further comprising the step of preventing backflow of water from the sanitizing region into a water supply through the use of a back flow prevention valve.